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Chief, Operations and Training Division/OC

20 September 1955/

Chief, Engineering Division/OC

Infrared Communications Systems

1. A review of the operational characteristics desired of infrared communications equipment is sought to establish whether equipment under development by the [] Manufacturing Company under TSS/APD sponsorship and equipment proposed by the Navy's Underwater Sound Laboratory are suitable for Agency use.

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2. [] has been engaged in the development of a portable infrared communications transceiver for approximately one and one-half years at a cost of approximately \$300,000. The delivery of three prototypes of the equipment is anticipated in January 1955. Informal discussions with respect to infrared development at the Underwater Sound Laboratory seemingly offers broadened operational utilization for equipment that could be developed at a cost of approximately \$20,000. A discussion of the operational characteristics of the two infrared communication systems follows:

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A. The [] device has an operating range of 6 land miles with a beam width of 2 degrees. The dimensions are approximately 18" X 12" X 8". The weight is 15 - 18 pounds exclusive of power supply. It is planned that the equipment will be powered by a gasoline generator or rechargeable batteries (Silvercells). The [] unit is capable of voice modulation and a carrier is utilized to establish initial contact (no provision for CW communication is made). Because the same optics are used for both transmitting and receiving, only simplex operation shall be possible. The light source is a 30 watt tungsten lamp with a 30 hour life and is modulated mechanically with a high efficiency. (A note-worthy achievement). The two degree beam width of the [] device suggests rigid alignment techniques and comprehensive signal plans which seemingly would restrict operational compatibility for broadened utilization. Ideal alignment for the equipment would include engineered installation in a building wall or chimney during daylight with the aid of telescopes for fixed station operation. It is not anticipated that communication contact could be established, or if otherwise established, maintained, with any movement of the device. Due to the requirement for continuous and accurate alignment for satisfactory operation,

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DOC	3	REV DATE	6/3/80	BY	37169
ORIG COMP	33	OPI	66	TYPE	02
ORIG CLASS	S	PAGES	2	REV CLASS	C
JUST	22	NEXT REV	2010	AUTH:	HR 70-2

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it does not appear feasible that the equipment may be operated while in motion, either vehicular or walking. On the other hand, the [] device does possess an extended operating range and utilizes minimum power requirements. The actual power requirements, although not as yet determined, might approximate one-half of that required for the Navy version of portable infrared equipment, described below.

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B. The equipment as proposed by the Underwater Sound Laboratory would have an operating range of 2 1/2 miles and a beam width of 15 degrees. Physical dimensions exclusive of the power supply would approximate 12" X 8" X 4" and weigh approximately 11 pounds. Provisions for both CW and voice communication would be provided. Electronic modulation would be accomplished with the employment of a cesium vapor tube as the infrared light source. Power requirements would be 30 watts for the modulator, 9 watts for filament supply and 22 watts for the cesium lamp. The power supply would consist of miniature rechargeable batteries and a vibrator for supplying 250 volts for the modulator and receiver. The Navy's concept of infrared equipment provided a 15 degree beam width at the expense of operating range but removes serious alignment problems. The power requirements considerably exceed those required by the [] Tungsten light source with the net results that the rechargeable batteries would require charging more frequently - possibly with each hour of operation. The cesium vapor light source proposed by the Navy requires a 10 minute ionization time prior to operation.

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3. Your comments with respect to the operational characteristics of these two infrared communications systems are desired for the preparation of an infrared Staff Study to be presented to the Research and Development Production Review Board at an early meeting.

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JUST _____	NEXT REV _____	AUTH: NR 76-2

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20 September 1954

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